

**EMBARGOED: NOT FOR DISTRIBUTION
FOR INTERNAL USE BY MUSEUM ALLIANCE MEMBERS ONLY**

NASA TV Live Broadcast Schedule: 3:30 – 5:45 pm Pre-landing Coverage: All times given in PACIFIC DAYLIGHT TIME			
PM Start Time	Dur.	Description	Visuals on Screen
3:30	1:45	Program opens; Gay Yee Hill is the host from mission control, NASA's Jet Propulsion Laboratory.	Live camera in JPL Mission Control
3:32	5:30	Hill lead-in to video "Challenges of Getting to Mars: Seven Minutes of Terror."	VIDEO, Duration: 3:56
		Hill will set the stage for what live locations will be featured in the program, and let people know about the Blog that an engineer will write in real-time from within mission control at JPL, then give key events in the entry, descent, and landing timeline.	Live cameras: Mission control at JPL, Space Operations Center in Tucson; Mission Control at Lockheed Martin & blog/key events graphics
3:38	6:00	INTERVIEW: Robert Shotwell , Project Systems Engineer and Mission Commentator. Shotwell will be 'translating' the graphics and events happening in Mission Control for the audience.	Graphics of Doppler plots, altitude plots; computer simulation of what the spacecraft is doing.
3:44	3:30	Hill lead-in to science overview video "Hunting for Habitats," which provides a general mission overview of Phoenix and its science questions.	Computer Animation.
			VIDEO, Duration: 2:56
3:48	6:00	INTERVIEW: Peter Smith , University of Arizona and Phoenix Principal Investigator. Smith will discuss the "Follow the Water" science strategy for NASA's Mars Exploration Program (since water is key to life as we know it) and an overview of how Phoenix's scientific objectives take the next steps beyond following the water to "Following the Carbon" (looking for the chemical building blocks for life).	Landing site flyover animation, Mars Odyssey 2001 gamma ray spectrometer image showing where subsurface water-ice is located, permafrost, animation of instruments deploying
3:54	4:30	Hill lead-in to video "Challenges of Getting to Mars: Cruise," which discusses engineering feats including trajectory correction maneuvers that happen on the ~9-month journey to Mars in order to tweak the spacecraft's path for an on-target landing.	NASA ID; Computer Animation.
			VIDEO, Duration: 4:14
3:59	2:30	LISTEN: Catalyst Bed Heaters Turn On After Phoenix's long journey in the cold temperatures of space, these heaters are used to get things warmed up prior to turning on the thrusters used for "Turn to Entry" (positioning the spacecraft to enter the martian atmosphere).	Live cameras: Mission control at JPL
4:00	6:00	INTERVIEW: Barry Goldstein , Phoenix Project Manager, JPL. Goldstein will discuss Phoenix's heritage/relationship to past Mars missions (Mars Polar Lander, Mars Surveyor), that Viking was the last success of this type, and how Phoenix is harder.	NASA ID; Computer Animation.
			ANIMATION

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4:06	3:00	LISTEN: The orbiters will be getting ready to receive signals from Phoenix during entry, descent, and landing. 1) Readiness Polls for orbiters poised to relay Phoenix data back to Earth (Mars Odyssey, Mars Reconnaissance Orbiter, and Mars Express); 2) Direct-to-Earth Orbiter Readiness Reporting 3) Odyssey Display Set Up	Live cameras: Mission control at JPL and Lockheed
4:09	1:00	LISTEN: Mars Reconnaissance Orbiter Readiness Poll; Absolute Slew Completed (A slew maneuver changes the spacecraft's orientation to maximize desired viewing or communications opportunities. In this case, MRO's antenna will be oriented to receive Phoenix's signal and relay it to Earth.)	
4:10	5:00	INTERVIEW: Ed Sedivy , Lockheed. Sedivy will first cover the spacecraft and all of the extensive testing that has occurred to ensure the best possible chance of a successful landing. Using a butterfly analogy, Sedivy will discuss the difficulties of going from one kind of spacecraft (lander in "cocoon" of protected aeroshell) to free lander on the surface with unfurled solar panels ("butterfly wings").	Video of spacecraft construction, water hammer testing
			Graphics of spacecraft metamorphosis
4:15	4:00	LISTEN: Propulsion System Pressurization <i>*if loss of communications, contingency programming would occur from here on</i>	Live cameras: Mission control at JPL and Lockheed
4:19	1:00	NASA ID/Mission Status	
4:20	1:00	Shotwell interprets Odyssey readiness poll and completed slew (turn).	Live computer simulation from mission control and live cameras at JPL and Lockheed
4:21	1:00	Shotwell : Orbiter Readiness Reporting.	
4:22	4:00	INTERVIEW: Fuk Li , JPL Mars Exploration Program Director. Li will discuss the challenges of Mars and that whatever happens, we'll learn for future missions given 3 orbiters will be collecting information about Phoenix's entry, descent, and landing. Also mentions how the National Radio Astronomy Observatory antenna in Green Bank, West Virginia will be listening for the direct-to-Earth UHF signal from Phoenix (but no data return).	Live cameras at JPL; graphics of Mars Reconnaissance Orbiter, Mars Odyssey Orbiter, & Europe's Mars Express orbiter; graphic of Green Bank antenna
4:26	5:00	Shotwell : Verification that Phoenix has started its entry, descent, and landing sequence and verification of star tracker power (star trackers are used for navigation).	Live computer simulation from JPL mission control
		LISTEN and NASA ID/Mission Status (voiceover); Factoids	

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4:32	6:00	Shotwell: Mars Reconnaissance Orbiter Readiness Poll: Expected Electra (UHF antenna onboard the orbiter specially designed to help determine distance and speed in relation to Mars of incoming spacecraft).	Live cameras at JPL
		Shotwell: Open Loop Record Sequence Opened (for capturing and storing Phoenix landing data for later Earth return); Orbiter Readiness Reporting	Live computer simulation in mission control
		NASA ID/Mission Status (voiceover)	
4:38	1:00	CALL OUTS: Expected Receipt of Odyssey Data, Actual Receipt of Odyssey data, MRO confirmation of start of Open Loop recording and verification that cruise components are off after UHF acquisition	Live cameras at JPL and Actual Receipt
*Note: very slow 6-minute period; all that's happening is that the spacecraft is slewing (turning) to entry position; good time to chat with audiences and get them ready for the "Seven Minutes of Terror" of Entry, Descent, and Landing			
4:39	1:00	Shotwell interprets: Planned Loss of Phoenix's X-band Communications Signal CRUISE STAGE SEPARATION CALL OUT: Standby for UHF Signal Acquisition (Odyssey or Direct To Earth) CALL OUT: Confirmation of Cruise Stage Separation & UHF Carrier Signal Acquisition NASA ID/Mission Status (voiceover) *if loss of communications at cruise stage separation, contingency programming would begin	Live real-time computer simulation of what the spacecraft is doing.
4:40	1:00	Shotwell interprets: TURN TO ENTRY	Live real-time computer simulation of what the spacecraft is doing
4:40:54		CALL OUT: Turn to Entry	
4:41:04	3:00	CALL OUT: Turn to Entry Confirmation	Live cameras from mission control
		Shotwell interprets: Perform DMD LAD Flush/Red Alarm Update That is, as Phoenix gets ready for entry, descent, and landing, it clears out its computers. Roughly speaking, it takes a "screen grab" of past engineering data onboard, archives it, then clears its system so it starts fresh prior to entry.	
4:44		CALL OUT: 1) Mars Reconnaissance Orbiter Planned Loss of Signal 2) Expected time and confirmation of Phoenix transmitting at a data rate of 8 kb/s (when backshell comes off, the spacecraft switches to Phoenix's helix antenna, which sends data back at 32 kb/s)	Live cameras from mission control
4:46		CALL OUT: Expected Time Atmospheric Entry	

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PM Start Time	Dur.	Description	Visuals on Screen
		LISTEN	

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PM Start Time	Time to Next Step	Description	Visuals on Screen
Entry, Descent, & Landing: “Seven Minutes of Terror”			
4:46:33	3:42	ENTRY & DECELERATION THROUGH THE UPPER MARTIAN ATMOSPHERE	Live camera in JPL Mission Control and live computer simulations of what the spacecraft is doing
4:47:00		START COMMUNICATIONS BLACKOUT DUE TO HOT PLASMA SURROUNDING SPACECRAFT DURING ENTRY	
4:48:00		PEAK HEATING	
4:49:00		END COMMUNICATIONS BLACKOUT	
4:50:15	0:15	PARACHUTE DEPLOYS (+ or – 13 seconds)	
4:50:30	0:10	HEAT SHIELD JETTISONED (+ or – 13 seconds)	
4:50:40	0:50	LEGS DEPLOY (+ or – 13 seconds)	
4:51:30	1:39	RADAR TURNS ON	
4:53:08		<i>Transmission Gap during Switch from UHF antenna on the cruise stage (spacecraft that carried Phoenix to Mars) to Helix Antenna on Lander (4:53:08 – 4:53:14)</i>	
4:53:09	0:03	LANDER SEPARATES FROM BACKSHELL (+ or – 46 seconds)	
4:53:12	0:22	DESCENT THRUSTERS THROTTLE UP	
4:53:34	0:18	CONSTANT VELOCITY PHASE BEGINS (+ or – 46 seconds)	
4:53:52	1:00	TOUCHDOWN (+ or – 46 seconds) <i>*if loss of communications during or prior to touchdown, contingency programming would begin</i>	
4:54:52	About 20 mins while dust settles	LANDER RADIO TURNS OFF (+ or – 46 seconds)	

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4:53	1:00	LISTEN: Confirmation of Helium Venting This venting removes any remaining pressure in the thruster tanks.	Live camera in JPL Mission Control
4:54	2:00	LISTEN: Phoenix UHF Off (Confirmation of Loss of Signal) NASA ID/Status Update (Voiceover)	
4:57	1:00	LISTEN: Mars Reconnaissance Orbiter Open Loop communications	
4:58	2:03	LISTEN: Post Entry, Descent, and Landing Assessment Poll (Odyssey, Direct To Earth, and Green Bank antenna) NASA TV ID/Recap	
5:03	3:00	LISTEN: Odyssey Bent Pipe Canister Data	
5:06	1:00	LISTEN: Green Bank antenna Stops Recordings	
5:07	4:00	INTERVIEW: Barry Goldstein , Phoenix Project Manager	
5:12	2:00	LISTEN: For data returns: Odyssey Overflight Data, Packet Gap Report (any data loss), Window Dumps, DMD Pages	
5:14	5:00	INTERVIEW: Peter Smith , Principal Investigator	
5:19	3:00	LISTEN	
5:22	5:00	INTERVIEW: Doug McCuistion , Mars Exploration Program Director, NASA HQ	
5:27	3:00	LISTEN: Confirm Start of Mars Reconnaissance Orbiter Downlink NASA ID Update (Voiceover)	
5:30	10:00	Post-Landing Poll	
5:40	4:00	INTERVIEW: Charles Elachi , Director, Jet Propulsion Laboratory	
5:44	1:00	Hill wraps up with tease for first downlink opportunity and news conference. Thanks to Partners.	
5:45	0:45	Clean feed of JPL Mission Control, No Commentary	
6:30		Hill resumes commentary for first downlink opportunity.	

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NASA TV Live Broadcast Schedule: 6:30 – 10:00 pm Post-landing Coverage: All times given in PACIFIC DAYLIGHT TIME			
PM Start Time	Dur.	Description	Visuals on Screen
6:30	1:00	Hill begins commentary for first downlink opportunity, with Peter Smith . Confirm end of Odyssey retransmission. End of Odyssey first playback of entry, descent, and landing data.	Live camera in JPL Mission Control
6:31	4:00	Hill and Smith recap successful landing. Discuss solar array deployment and approximately 30 hours of power available.	VIDEO: Recap highlights, instruments deploying, University of Arizona Testbed
6:35	1:00	LISTEN: Statistics on first retransmission of Odyssey Data	Live camera in JPL Mission Control
6:36	5:00	Hill introduction of video “Challenges of Mars: Surface Operations	VIDEO: duration 5:00
6:41	2:00	Smith wrap up as he goes to mission control to wait for possible images.	Live camera in JPL Mission Control
6:43	2:00	LISTEN: Odyssey UHF Rise for Bent Pipe Transmission: Begin Sol 0, PM Downlink	
6:45	9:00	INTERVIEW: Dan McCleese	Graphics related to Martian Arctic
6:54	1:00	Confirm completion of 1 st Mars Reconnaissance Orbiter downlink	Live camera in JPL Mission Control
6:55	7:00	Hill and McCleese discuss incoming data.	
<p style="text-align: center;">****Possible images between 7:01 and 7:15**** If you do local programming post-landing, be sure to tune back in for this possibility.</p>			
7:02	13:00	Odyssey UHF Set: about to go into 2 nd sleep	Live camera in JPL Mission Control
7:15	1:00	Mars Reconnaissance Orbiter Open Loop Data Available. Start processing MRO data to generate spectral movie for engineering analysis purposes.	
7:16	14:00	Hill and McCleese discuss incoming data. Hill wraps up with discussion of partners, blog url, teaser for news conference.	
7:30	1:30:00	End of Program. Clean feed of mission control without commentary or b-roll playback. If events are still going, this is another opportunity for local programming. If not, audiences can be told to tune in to NASA TV from home for more.	
9:00	1:00:00	Press Briefing.	JPL
10:00		End of Programming	